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ABSTRACT

A study conducted in Israel investigated the relevance of subject-specific reading passages to performance on reading comprehension tests for advanced university students of English as a second language. The research specifically examined (1) whether students performed better when the reading test content was directly related to their field of study or when the content was in another field but of comparable difficulty and comprehensible to the educated layman, and (2) whether the position of a text in a multiple-text exam affects reading comprehension performance. Results showed that comprehension was affected in some cases by content, but less than expected, a finding possibly explained by individuals' English reading competence or by the broad groupings of fields of study (science and technology, humanities, and biology). The order of presentation did not seem to affect performance, which has implications for situations in which different forms of the same test are desirable. (MSE)

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DO CONTENT AREA PASSAGES AFFECT STUDENT PERFORMANCE ON READING COMPREHENSION TESTS?

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Tests of reading comprehension have traditionally been based on texts which are considered to be comprehensible to the educated layman, thus not requiring specialist knowledge. However, recent developments in language testing are moving towards subject-specific tests. Such ESP (English for Specific Purposes) tests are based on the belief that it is more valid to test the reading comprehension of an engineering student on an engineering topic rather than on a social science topic and vice versa. Empirical evidence in favor of either the general or the specific approach is lacking. This paper is a report of a study designed to investigate the relevance of student background discipline on tests of reading comprehension in EFL (English as a Foreign Language). 185 students from three faculties - Science and Technology, Biology, and Humanities and Social Science - were tested on three texts related to their respective content areas. It was found that content area passages do affect student performance on reading comprehension tests, but not as greatly as had been expected. It was also found that the order of presentation of a reading passage in a multiple-text test does not affect student performance.

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More and more university students throughout the world are required to learn EFL (English as a Foreign Language) in order to read textbooks and professional journals which are written in English. This in turn leads to the need to develop tests which permit an effective assessment of the reading comprehension abilities of students who come from a wide range of academic disciplines, but who are often grouped together in broad categories in EFL instructional courses.

It follows then, that a pertinent question for test constructors is whether reading comprehension ability is assessed better by tests whose content is subject specific, i.e. related to the students' general field of study, or by tests whose content is more global, i.e. of general interest.

Proponents of the general-interest text in reading comprehension tests argue that reading proficiency, and not subject-related knowledge, should be tested. Therefore, a particular group of students is not favored when the text is of general interest. Furthermore, if students can demonstrate comprehension on a general-interest text, it can be assumed that they can comprehend texts in their own field of study.

These arguments are challenged by Alderson and Urquhart who have stated that "it is arguable that there is no such thing as a general

text...since what is general knowledge for one reader may be highly specific and esoteric for another. This is particularly the case with students from quite different cultures" (1983:121). They also note that

> we may be hesitant about accepting the existence of a general reading ability. While such a thing may certainly exist among educated native speakers who are exposed to a wide variety of texts, it is quite feasible to suggest that an L2 learner may have acquired much more specific skills for dealing with a far narrower range of text types (1983:121-122).

Recent developments, particularly in the United Kingdom, have led to the development of tests which are more specifically suited to the target discipline of the test takers. However, this trend "merely reflects changes in language teaching practice towards specific purpose teaching, ESP" (Alderson and Urquhart 1983:122). Empirical evidence on the effect of subject-specific related texts to performance on reading comprehension tests is extremely limited.

Those in favor of the subject-related text in reading comprehension tests point out that it seems more appropriate to test students on texts which are related to their field of study, especially in an ESP context. A student "may have acquired a competence in reading

texts related to his subject area without being able to display this competence towards 'general texts'" (Alderson and Urquhart 1983:122).

Arguments can be presented against the subject-related text in reading comprehension tests. When students from a number of related disciplines are grouped together, a subject-specific text may favor a particular group. Moreover, it may be difficult to "fit" cross-disciplinary students with a suitable subject-specific text. Finally, practical and financial considerations may preclude the construction of a large number of tests.

REVIEW OF THE LITERATURE

The effect of content familiarity, vocabulary clues, and English proficience on cloze scores of 312 students grouped in three broad categories - Arts, Sciences, and Social Sciences - at Chinese University of Hong Kong was investigated by Moy (1975). While significant interaction between academic field of subject and content matter of test passage was found, Moy claims that "the actual source of the interaction is difficult to explain" (1975:91). Although Science majors in this study obtained highest mean scores on the science passage, they also had highest mean scores on the other passages. The Social Science majors had highest mean scores on the history passage on which it was predicted that the Arts

majors would do best. Moy concluded that the "original hypothesis that majors would do better on cloze passages dealing with their own academic fields was not demonstrated in this study" (1975:71). Moy (1975) emphasized both the importance and the difficulty of controlling for passage difficulty across content area (the Dale Chall readability formula was found to be an insufficient measure) as well as for language proficiency across faculties.

Somewhat different results were obtained by Alderson and Urquhart (1983) in a small pilot study conducted with 37 graduate students from different academic disciplines and from various language backgrounds. Subjects were grouped into four categories and tested on cloze passages related to three content areas. Language proficiency was controlled to some extent, but passage difficulty was determined on the basis of the results of the test. On the whole, it was found that students did better on texts taken from their own subject discipline than did students from other disciplines on the same text. However, text difficulty seems to have outweighed content familiarity in this study. Thus, all students, including the Arts and Social Science students, found the general text to be the most difficult and one of the engineering texts to be the easiest.

It should be noted that both Alderson and Urquhart (1983) and Moy (1975) used the cloze test in their studies. It is questionable whether the cloze format is the best way to assess the kind of reading comprehension required for reading academic textbooks and

professional journals. The filling-in of specific blanks is predicated more on a knowledge of vocabulary, syntax, and grammar than on comprehension and understanding of the subject and of the author's purpose and viewpoint.

Lipson's (1984) subjects were fourth, fifth, and sixth graders, designated as above average readers, who were assigned three reading passages, the contents of which were assumed to be totally familiar, partially familiar, and totally unfamiliar. On retrieval-of-information tasks, subjects scored highest on the passage with the totally familiar content and lowest on the passage with the partially familiar content. This finding accords with the results of previous studies (Reynolds et al. 1982; Steffensen et al. 1979) which suggest that in some cases prior knowledge, even among fluent readers, can interfere with comprehension, if it conflicts with information in the text.

RESEARCH QUESTIONS

This paper describes a study conducted at Ben Gurion University of the Negev, Beer Sheva, Israel, in the spring of 1984. The study investigated the relevance of subject-specific reading passages to performance on reading comprehension tests for advanced EFL students.

The research questions were formulated as follows:

1. Will students of EFL perform better on a reading comprehension tests whose reading content is related to their general field of study, or on a reading comprehension test whose content is related to another subject, given that the texts are of approximately comparable difficulty and comprehensible to the educated layman?

2. Does the position of a text in a multiple-text exam effect reading comprehension performance?

METHODOLOGY

The subjects consisted of 185 EFL students at Ben Gurion University of the Negev: 107 students in four Science and Technology classes, 29 students in the single Biology class, and 49 students in three Humanities and Social Science classes. (At Ben Gurion University of the Negev students of EFL from related disciplines are grouped into the aforementioned categories. Separate readers, with reading material related to the background disciplines of the students, are used for instruction by each group.) Since students are placed into one of the various instructional levels of EFL - Basic I and II, Intermediate I and II, and Advanced I and II - on the basis of a centrally administered nationwide EFL placement exam, it was assumed that the subjects of this study (Advamced II students) were all at approximately the same level of reading proficiency.

Three passages were excerpted from articles that had appeared in

Advanced II Science and Technology, Biology, and Humanities and Social Science readers; the students were not familiar with the passages. The Humanities and Social Science passage dealt with the ethics of experimentation with human subjects; the Biology passage with toxic substances and ecological cycles; and the Science and Technology passage with the fuel economy of light vehicles. All the passages were approximately the same length.

The format of the test was similar to tests administered during the school year. Each test passages was followed by a set of questions. The questions were grouped into three broad categories: general comprehension, referent, and vocabulary-in-context. The three formsa of the test were obtained by changing the order of the test passages and their related questions (Form I: Biology, Science/Technology, Humanities/Social Science; Form II: Science/Technology, Humanities/Social Science, Biology; Form III: Humanities/Social Science, Biology, Science/Technology). The three different test forms were randomly distributed to each class that participated in the study (one-third received Form I, one-third Form II, and one-third Form III).

The test was administered during the students' regular class hours and students were allowed 1½ hours to complete the test. No dictionaries were permitted to be used.

RESULTS

The means, N's, and standard deviations of the scores for each content area test passage are presented in Table 1. The mean scores (percentages) for the entire test for each faculty are presented in column four and the mean scores for each test passage across faculties are presented at the bottom of the table.

--- Insert Table 1. ---

A breakdown of the results by faculty showing the number of students that performed best on each subtest is presented in Table 2.

--- Insert Table 2. ---

A three-way analysis of variance (three versions, three content area texts, three faculties) yielded significant differences in the overall performance between students of the three faculties [$F, (2.175=28.37) p<.0001$] and a significant interaction between text and faculty [$F, (4.350=14.92) p<.0001$].

A one-way comparison of variances between different texts in each faculty showed no differences for texts for students of Humanities and Social Sciences, while differences were significant for students of Biology [$F, 2.56=6.61) p<.003$] and for students of Science and Technology [$F, (2.216=49.94) p<.0001$].

Table 1. Means, n's, and standard deviations of scores for each content area text, classified by faculty

	Content Area			Mean for faculty
	Humanities/ Social Science	Biology	Science/ Technology	
Humanities/ Social Science Faculty n= 49	$\bar{X}$=57.65 S.D.=20.06 n=49	$\bar{X}$=50.76 S.D.=21.7 n=49	$\bar{X}$=51.89 S.D.=20.13 n=49	$\bar{X}$=54.20 n=49
Biology Faculty n=29	$\bar{X}$=58.62 S.D.=21.15 n=29	$\bar{X}$=74.56 S.D.=17.8 n=29	$\bar{X}$=63.05 S.D.=20.38 n=29	$\bar{X}$=65.40 n=29
Science/ Technology Faculty n=107	$\bar{X}$=61.56 S.D.=18.7 n=107	$\bar{X}$=72.19 S.D.=18.5 n=107	$\bar{X}$=82.77 S.D.=20.2 n=107	$\bar{X}$=72.17 n=107
Mean for content area test passage	$\bar{X}$=60.06 S.D.=19.43 N=185	$\bar{X}$=66.89 S.D.=21.53 N=185	$\bar{X}$=71.50 S.D.=24.35 N=185	

Table 2. Percentage of students who performed best on subtests, classified by faculty

Highest score by text / Faculty	Highest score on Sumanities/ Social science text	Highest score on Biology text	Highest score on Science/ Technology text	Scored equally high on 2 or 3 texts
Humanities/ Social Science N=49	38.7 % n=19	22.5% n=11	16.3% n=8	22.5% n=11
Biology N= 29	24.7% n=7	55% n=16	3% n=1	10.3% n=5
Science/ Technology N=107	8.4% n=9	24.3% n=26	39.3% n=42	28% n=30

A Schaffé post hoc test indicated that students of Biology did significantly better ($p<.01$) on the Biology test than on the other two tests for which there was no significant difference, while for the students of Science and Technology all differences were significant at the $p<.01$ level.

Because a marginal significance for text by version [F, $(4.350=2.56)p<.04$] was obtained, three one-way analyses of variance comparing various positions of each test passage were performed. These did not yield significant differences.

Test reliability (Kuder Richardson formula $\overline{20}=.73$) proved acceptable, though not very high. The small number of test items and the fact that they test different skills may account for this in part.

DISCUSSION

Expectations that the mean scores for the entire test would be approximately the same for students of the three faculties but significantly higher on the field-of-study related test passage for students of each faculty were only partially realized.

As indicated by the figures in Table 1, students of Science and Technology obtained the highest mean grade on the entire test as

well as the highest mean grades on all individual test passages (with the exception of the Biology-related test passage where they scored only slightly lower than the Biology students). One possible explanation for the fact that Science and Technology students did so well on the entire test might be related to the fact that the entrance requirements of the faculties of Science and Technology are higher than those of the faculty of Humanities and Social Science. The higher mean scores of the Science and Technology students could, therefore, reflect a higher level of overall competence.

Another explanation for the better performance of the Science and Technology students on the entire test might be a result of the particular comprehension strategies developed by this group of students. Science and Technology students are taught how to comprehend processes, hypotheses, theories, experiments, etc., whereas Humanities and Social Science students usually read in order to determine author's main idea, supporting ideas, and general viewpoint. This difference in approach to the reading material might result in the development of more effective reading comprehension strategies. (Moy (1975) also found that Science majors scored higher than Social Science and Arts majors.)

The question whether students would perform better on a reading comprehension test if the content of the reading passage were related to their general field of study than if the reading

passage were related to another subject was not answered conclusively. While there was a statistically significant difference in performance on subject-related test passages for students of Science and Technology and for students of Biology, the Humanities and Social Science students did not do significantly better on the test passage that was considered to be more closely related to their academic disciplines.

In a more detailed analysis of the data, the results obtained by each student on the three test passages were ranked and the percentage of students in each faculty who obtained the highest score on their respective field-of-study related passage was noted. The results (presented in Table 2) indicate that only in the case of the Biology students did more than half (55%) receive highest scores on their subject-related test passage. For Humanities and Social Science students and for Science and Technology students this percentage decreased to about 39%. In other words, for most of the students in this study, the fact that a text in a reading comprehension test was related to their general field of study did not appear to make it easier to comprehend than texts related to other subjects.

One possible explanation for this finding is that the texts selected for the study were only indirectly related to the students' specialized fields of study, and thus the content may have been only partially familiar. If this conjecture is true, the results

obtained in this study would support Lipson's (1983) conclusions that a totally unfamiliar text is often easier to comprehend than a text with a partially familiar content. In any case, the findings obtained in this study indicate that just because a text is in the general area of a test taker's specialized field of study, it is not easier to comprehend than a text on a more general topic.

There are two possible explanations for the fact that there was no statistically significant interaction between text and faculty for students of Humanities and Social Science. The Humanities and Social Science-related test passage was less specifically related to the subjects' background disciplines and thus conferred less of an advantage on the Humanities and Social Science students. A second explanation may be that since the Humanities and Social Science students were the poorest performers on the entire test, it is possible that relevance of subject-related content matter to performance on a reading comprehension test is related to level of reading competence. In other words, one could ask who will profit more from the fact that a reading passage is on a familiar subject - a more competent reader or a less able one? The findings of this study seem to suggest that the more proficient readers (in this study, the Science and Technology and the Biology students) were those who benefited most from content-related reading passages on the reading comprehension test, while the less proficient readers

(in this study, the Humanities and Social Science students) benefited the least. This conjecture needs to be carefully investigated, however.

It was also found that different forms of the same test, constructed by changing the order of presentation of text passages and related questions, did not affect performance on the test.

CONCLUSION

It appears that student performance on reading comprehension tests was affected in some cases by content-related passages, but less than had been expected. Based on the findings, it may be argued that texts which are only indirectly related to the test taker's major field of study do not greatly change performance on reading tests. It could be that reading competence in EFL may be a factor in determining whether content-related passages are relevant to performance on reading comprehension tests. Although it seems that a text which deals with ethical concerns rather than with the fuel economy of cars is more appropriate to test the reading comprehension of Humanities students, the findings indicate that the effect on the scores is minimal. Therefore, in situations where students from different disciplines are grouped in broad categories, such as Science and Technology or Humanities and Social Science, the construction and administration of different content-related tests

may not be justified.

Although order of presentation of test passages does not seem to affect performance, this finding has practical implications where it is desirable to have different forms of the same test.

SUGGESTIONS FOR FURTHER RESEARCH

Suggestions for further research include replicating the study using reading passages which are more specifically related to the students' specialized fields of study. It is also suggested that a language test be administered so that the relationship between language proficiency and performance on subject-related passages may be investigated. This study could be repeated using only subjects from a single background discipline; in this way familiarity with content can be better controlled.

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